

NON-PUBLIC?: N
ACCESSION #: 8905240026
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Brunswick Steam Electric Plant Unit 1 PAGE: 1 of 4

DOCKET NUMBER: 05000325

TITLE: TCV Fast Closure Reactor SCRAM After PLU Testing Due to Electrical Noise

EVENT DATE: 11/10/88 LER #: 88-024-02 REPORT DATE: 05/15/89

OPERATING MODE: 1 POWER LEVEL: 71.6

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Terri Jones, Regulatory Compliance - TELEPHONE: (919) 457-2039
Specialist

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On November 10, 1988, at 2025 hours, the Unit 1 reactor scrammed due to a momentary Turbine Control Valve Fast Closure circuitry trip. The initiating signal is believed to have resulted from electrical noise in the turbine Electro-Hydraulic Control (EHC) system during the performance of a weekly Power/Load Unbalance (PLU) Test. The unit was brought to cold shutdown and a scheduled refueling outage was started a day early. Troubleshooting efforts determined that the Reactor Protection System received three out of four inputs from the Turbine Control Valve Fast Closure circuitry due to a suspected hydraulic pressure transient induced by the spurious closure of the Intercept Valves caused by electrical noise generated by the PLU test relays. Diodes have been installed on Unit 1 and will be installed on Unit 2 to 1 suppress the electrical noise.

During this event the unit was operating at 71.6% power. The Reactor Core Isolation Cooling System, Automatic Depressurization System, A and B Residual Heat Removal/Low Pressure Coolant Injection Systems, and the A and B Core Spray

Systems were operable and in standby readiness.

This event had minimal safety significance as the unit is analyzed for a turbine trip from full power without bypass and, in this instance, the control and stop valves remained open until the turbine tripped on reverse power at which time the bypass valves operated properly.

END OF ABSTRACT

TEXT PAGE 2 OF 4

Initial Conditions

Unit 1 was operating at 71.6% power. The Reactor Core Isolation Cooling System (RCIC) (EIIS/BN), Automatic Depressurization System (ADS) (EIIS/*), High Pressure Coolant Injection System (HPCI) (EIIS/BJ), A and B Residual Heat Removal/Low Pressure Coolant Injection System (RHR/LPCI) (EIIS/BO), and the A and B Core Spray Systems (CS) (EIIS/BM) were operable and in standby readiness.

Event Description

On November 10, 1988, at 2025 hours, a reactor scram occurred while the unit Control Operator (CO) was performing the weekly Power/Load Unbalance (PLU) test as per Operating Procedure (OP) 26, Section 8.16, on the Electro-Hydraulic Control System (EHC) (EIIS/TG) circuitry. The operator had completed the test satisfactorily and was signing the procedure off as complete when he heard noises (relays picking up) in the panel. When he looked up the PLU meter was reading upscale, indicating a PLU. In an attempt to prevent a turbine trip, the operator depressed the PLU test push button to reset the PLU load reject command. However, the Control Valve Fast Closure was sensed on three of four pressure switches in the Turbine Control Valve (TCV) Fast Closure circuitry, resulting in an Auto SCRAM trip in both the A and B Reactor Protection System (RPS) trip circuitries. During the SCRAM recovery, the lowest water level reached was 132 inches. Group 2 and 6 isolation commands were received and the corresponding valves closed as required. The Group 8 isolation command was already in due to the reactor being at operating pressure at the time of the SCRAM and the associated valves remained closed. During the SCRAM, control rods 22-23 and 18-31 were noted to have bounced out to position 02 and were manually inserted back to position 00. No Emergency Core Cooling Systems (ECCS) were required to operate during the SCRAM. The Diesel Generators auto started when a Generator Primary Lockout was received due to a generator trip on Reverse Power. However, the diesels were not required to tie to the emergency buses as they were still powered from the balance of plant buses. At 2200 hours the SCRAM was reset and the unit was continuing on to cold shutdown and a scheduled refueling outage.

Event Cause

The root cause of the TCV fast closure is believed to be electrical noise generated in the EHC System during the performance of the PLU test. The noise initiated a momentary Intercept Valve (IV) Fast Closure thus causing a transient of sufficient magnitude on the EHC hydraulic trip pressure system to actuate three of the four TCV Fast Closure Reactor Protection System (RPS) inputs. This conclusion is supported by the following:

*EHS Component identifier not available.

TEXT PAGE 3 OF 4

1. "Intercept Valve Fast Closure" was recorded as the initiating event on the EHC First Hit Panel.
2. General Electric has modified the PLU Test circuitry on more recently manufactured units to include a diode network intended to suppress electrical noise generated by the test relays. The modification has not yet been installed at Brunswick.
3. Testing revealed that deenergizing the PLU test relays did create a measurable spike on the IV Fast Closure voltage comparators inputs and that the diode network would eliminate these spikes.
4. Response testing of the EHC System to IV Fast Closure, early in the current outage, duplicated the actuation of two of the RPS inputs for TCV Fast Closure with similar reset times. However, more detailed testing later in the outage with instrumentation installed to measure the actual pressure drop was unable to duplicate the earlier results. CP&L believes that maintenance carried out on the EHC System during this outage, including an overhaul of the Bypass Valve actuators, may have change the system load prior to these later tests resulting in the system being able to absorb the transient. The final tests demonstrated that an IV Fast Closure transient would generate a spike on the system of approximately 300 psi.
5. Inspection and testing of the PLU circuitry did not reveal anomalies, nor was a PLU recorded on the first hit panel.
6. The turbine and generator remained on line until 53 seconds after the RPS SCRAM signals when the generator tripped on Reverse Power initiating a turbine trip.

Corrective Actions

Diodes have been installed in the Unit 1 EHC circuitry. A plant modification to

install the diodes in the Unit 2 EHC circuitry is being developed and is expected to be installed during the next outage of sufficient length.

Control rod drive 18-31 was replaced on December 4, 1988.

Control rod drive 22-23 was replaced on December 5, 1988.

TEXT PAGE 4 OF 4

Past Similar Events

June 2, 1983. Unit 2 reactor SCRAM due to a steam pressure transmitter drifting out of calibration high thus preventing the PLU circuitry from resetting after the weekly test.

December 22, 1982. Unit 2 reactor SCRAM due to a relay crew technician inadvertently grounding out the load signal to the PLU circuitry.

Note that the PLU circuitry operated as expected during this event.

Event Assessment

This event had minimal safety significance as the unit is analyzed for a Turbine trip from full power without bypass. In this instance, the effect of the Turbine trip was mitigated by the fact that the Control and Stop Valves remained open, the initial power was only 71.6% and the Generator remained on line until it tripped on Reverse Power. After the Generator trip, the Bypass valves operated properly and prevented an increase in reactor pressure. The Emergency Core Cooling Systems were not required and the Diesels did auto start but were not required to power the buses.

ATTACHMENT 1 TO 8905240026 PAGE 1 OF 1

CP&L

Carolina Power & Light Company

Brunswick Nuclear Project

P. O. Box 10429

Southport, NC 28461-0429

May 15, 1989

FILE: B09-13510C 10CFR50.73

SERIAL: BSEP/89-0473

U.S. Nuclear Regulatory Commission

ATTN: Document Control Desk

Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT UNIT 1
DOCKET NO. 50-325
LICENSE NO. DPR-71
SUPPLEMENT TO LICENSEE EVENT REPORT 1-88-024

Gentlemen:

In accordance with Title 10 to the Code of Federal Regulations, the enclosed Supplemental Licensee Event Report is submitted. The original report fulfilled the requirement for a written report within thirty (30) days of a reportable occurrence and was submitted in accordance with the format set forth in NUREG-1022, September 1983.

Very truly yours,

J. L. Harness, General Manager
Brunswick Nuclear Project

TMJ/mcg

Enclosure

cc: Mr. S. D. Ebnetter
Mr. E. G. Tourigny
BSEP NRC Resident Office

*** END OF DOCUMENT ***
